MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

TCP1121 – COMPUTER PROGRAMMING

(All sections / Groups)

15 OCTOBER 2018
9.00 a.m – 11.00 a.m
(2 Hours)

INSTRUCTIONS TO STUDENT

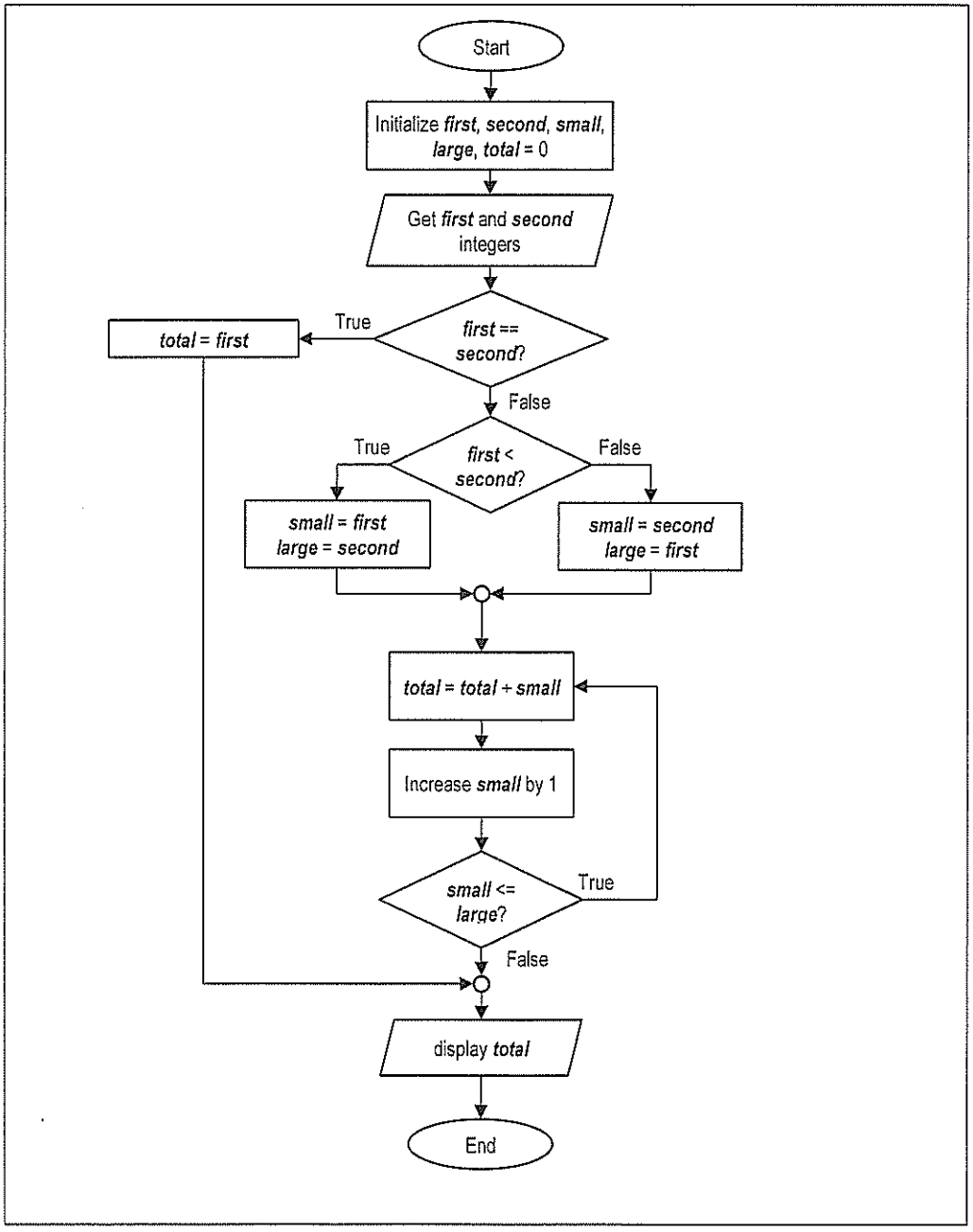
1. This question paper consists of 8 pages with 4 questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Write your answers in the Answer Booklet provided.

Question 1 [10 Marks]

a) The flow chart shows a program that read two integers from a user then computes and displays a sum value of the series of integers. Reproduce a complete C++ code based on the flow chart. [4 Marks]



Continued...

b) Write the output of the following C++ program.

i) [1 Mark]

```
float a = 5.2;
int b = 6, result = 0;
result = a * b;
cout << result;
```

ii) [1 Mark]

```
int a = 5, b = 8;
if (a > 5)
    b = b % 3;
else
    b = b % 3 + 4;
cout << "Result of b is " << b;
```

iii) [2 Marks]

```
int i = 0;
int arr1[] = {10, 20, 30, 40, 50};
char arr2[] = "TCP1121";

while(i < 4){
    cout << arr1[i] << arr2[i+1] << " ";
    i++;
}
```

iv) [1 Mark]

```
char *ptr;
char Str[] = "World_Cup_2018";
ptr = Str;
ptr += 5;
cout << ptr;
```

v) [1 Mark]

```
double compute(int &a, int b, double c){
    a = 2;
    b = a * c;
    return b;
}

int main(){
    int x = 5, y = 8;
    double z = 8.2;

    z = compute(x, y, z);
    cout << x << " " << y << " " << z;
    return 0;
}
```

Continued...

Question 2 **[10 Marks]**

a) The following program prompts a user to enter size and a starting value of the first element of the array. The subsequent elements of the array are increased by 1. Functions `insertArr()` and `displayArr()` are called to insert values into elements of array and to display array element's value, respectively.

Sample Output

```
Enter size of array : 5
Enter starting value : 15

    0    15
    1    16
    2    17
    3    18
    4    19
```

Complete the C++ program given the main function as follow:

```
#include <iostream>
using namespace std;

int main(){
    int arrSize, startVal;
    cout << "Enter size of array : ";
    cin >> arrSize;
    cout << "Enter starting value : ";
    cin >> startVal;

    (i) initialize elements of array named arrNum with 0

    // Called function insertArr()
    insertArr(arrNum, arrSize, startVal);

    // Called function displayArr()
    displayArr(arrNum, arrSize);

    return 0;
}
```

i. Initialize all elements of array named `arrNum` with size of `arrSize` to 0. [1 Mark]

ii. Complete the function named `insertArr()` to insert value to each element of the array start from the value of `startVal`. [2 Marks]

iii. Complete the function named `displayArr()` to output each array element's value. [2 Marks]

Continued...

b) Define logical error and give one example to describe the error. [2 Marks]

c) The C++ program below consists of syntax error(s) and logical error(s). The sample output of the code is also given.
Identify the errors and rewrite the correct code. [3 Marks]
Note: Please highlight or underline the corrected code.

Sample Output

```
Answer for pointer is 10
```

```
#include <iostream>
using namespace std;

void func1(){
    int x[3] = {0, 5, 8};
    cout << "Value in the array is " << x[2] << endl;
}

void func2(){
    int v1 = 5, *p1;
    p1 = &v1;
    cout << "Answer for pointer is " << p1 + 5 << endl;
}

void func3(int a){
    return a = a * a;
}

int main(){

    int act = 2, a = 6;
    switch (act){
        case 1: func1();
                break;
        case 2: func2();
        default: a = func3(a);
                cout << "Value of a is " << a;
                break;
    }
    return 0;
}
```

Continued...

Question 3 **[10 Marks]**

a) Given a `main` function as below, answer the following questions:

```
int main(){
    Point2d first;
    Point2d second(3.0, 4.0);
    first.print();
    second.print();
    first.set(1.0,1.0);
    first.print();
    return 0;
}
```

i. Write a class named `Point2d` with the following specification:
- Two private data member from type double: `m_x` and `m_y`.
- A constructor initializer that initializes `m_x` and `m_y` to user-defined value. If no value is defined, set the attributes to default 0.
- A function `set()` to set the variables to given values.
- A function `print()` to display the output as below. [4 Marks]

Sample Output

```
Point2d(0, 0)
Point2d(3, 4)
Point2d(1, 1)
```

ii. Add a member function named `distanceTo()` that takes another `Point2d` as a parameter, and calculates the distance between them. Given two points (x1, y1) and (x2, y2), the distance between them can be calculated as:

```
sqrt((x1 - x2)*(x1 - x2) + (y1 - y2)*(y1 - y2))
```

The `sqrt()` function lives in header `cmath`. [2 Marks]

```
int main(){
    Point2d first;
    Point2d second(3.0, 4.0);
    first.print();
    second.print();
    cout << "Distance between two points: ";
    cout << first.distanceTo(second) << endl;
    return 0;
}
```

Sample Output

```
Distance between two points: 5.0
```

Continued...

b) The following program could not be compiled.

```
class Base{
    private:
        int m_x;
    public:
        Base(int x): m_x(x){
            cout << "Base()\n";
        }
        ~Base(){
            cout << "~Base()\n";
        }
        void print() { cout << "Base: " << m_x << '\n';  }
};

class Derived: public Base{
    public:
        Derived(int y): Base(y){
            cout << "Derived()\n";
        }
        ~Derived(){
            cout << "~Derived()\n";
        }
        void print() { cout << "Derived: " << m_x << '\n'; }
};

int main(){
    Derived d(5);
    d.print();
}
```

i. Explain why the program could not be compiled. [1 Mark]

ii. Identify the error and rewrite the `Base` class to fix the error. [1 Mark]

iii. What is the output after fixing the error? [2 Marks]

Continued...

Question 4 **[10 Marks]**

a) Given the following program, answer the questions below.

```
class Company {
    public:
        ~Company() { cout << "Company's destructor!\n"; }
};

class Unit : public Company {
    public:
        ~Unit() { cout << "Unit's destructor!\n"; }
};

int main() {
    Company* a1 = new Unit;
    delete a1;
}
```

i. What is the output of the program? [1 Mark]

ii. The destruction of the object in the `main` function is incomplete due to a problem in class `Company`. Rewrite the code in class `Company` to complete the destruction of the object. [1 Mark]

iii. What is the output of the program if the destruction of the object in the `main` function is completed as question 4(a)(ii)? [1 Mark]

b) Given the `main` function and sample output, answer the questions below.

```
int main(){
    exchange<int>(3,7);
    exchange<char>('g','h');
    return 0;
}
```

Sample Output

```
7 and 3
h and g
```

i. Write a function template as `T`. [1 Mark]

ii. Write the function definition named `exchange()` that exchanges the content of its two arguments and display them as shown as the output above. [3 Marks]

Continued...

c) The following program decides the fee to be paid by the user based on the number of hours. Change the following program using exception handling. [3 Marks]

```
int main(){
    double hour;
    cout << "Number of hours: ";
    cin >> hour;
    if (hour < 1)
        cout << "Minimum number of hours is 1. Try again.\n";
    else
        cout << "Fee is RM"<<hour*2<<".\n";
}
```

End of Paper.